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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,432	12/31/2003	Stephen F. Smith	UBAT1110/0912.0	1772
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UT-Battelle/Chicago/BHGL P.O. Box 10395 Chicago, IL 60610			EXAMINER BURD, KEVIN MICHAEL	
			ART UNIT 2611	PAPER NUMBER
			MAIL DATE 05/06/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/750,432

Applicant(s)

SMITH ET AL.

Examiner

Kevin M. Burd

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 75-140 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 75-140 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SG/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

1. This office action, in response to the amendment and the request for continued examination filed 3/2/2009, is a non-final office action.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/2/2009 has been entered.

Response to Arguments

3. Applicant has cancelled the previously pending claims and amended the application to include new claims 75-140. New rejections of these claims are stated below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 75-122 and 124-140 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti et al (US 6,853,629) in view of Jones et al (US 6,108,317) further in view of Fathallah et al (US 6,381,053) further in view of Swanke (US 5,521,533).

Regarding claims 75, 89, 100, 107, 118, 124, Alamouti discloses a transmitter and a method of transmitting for generating a hybrid spread spectrum signal to transmit user data. Alamouti discloses there are four types of CDMA protocols classified by modulation, two of which are direct sequence (or pseudo-noise) and frequency hopping (column 2, lines 1-12). Column 2, lines 41-46 discloses well known hybrid CDMA systems comprising direct sequence/frequency hopping (DS/FH). Alamouti discloses the DS-CDMA protocol in greater detail in column 2, lines 12-27. DS-CDMA protocol spreads a user's data signal over a wide portion of the frequency spectrum by modulating the data signal with a unique code signal that is of higher bandwidth than the data signal (column 2, lines 12-21). Alamouti discloses the frequency hopping spread spectrum (FHSS) protocol in greater detail in column 2, lines 28-37. The FHSS protocol uses a unique code to change a value of the narrow band carrier frequency for successive bursts of the user's data signal (column 2, lines 28-33). The DS-CDMA and FHSS are the protocols combined in the hybrid DS/FH. Alamouti does not disclose a pseudo random (PN) code generator for generating a first stream of PN code words and a second stream of PN code words wherein the first stream of PN code words and the second stream of PN code words are interrelated by a predetermined relationship. Jones discloses a communication system utilizing cyclic code phase multiple access

codes. Figure 11 shows the cyclic shifting of PN codes for each user signal. Each user signal is spread with different PN codes (column 15, line 66 to column 16, lines 19). The code sequences are obtained by cyclically shifting, by one chip at a time, a single code sequence, called a mother sequence. Figure 8 illustrates the bit synchronous relationship 602 of the spreading sequence, e.g. 604, 606 of different users, e.g. 608, 610, respectively, obtained by cyclic shifts of the mother sequence 604 (column 19, line 59 to column 20, line 25). Therefore, the each of the PN codes used in the multiple access system is generated by cyclically shifting a mother sequence. This is the predetermined relationship between the first and second PN code words. Jones discloses it is advantageous to use these code words since the full cross correlation of the codes would be maintained for best multiple access performance, while the cyclic relationship between the independent sequences would enable simplification of gateway implementation (column 4, lines 6-16). Costs can also be reduced in the hardware (column 4, lines 17-30). For these reasons, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Jones into the transmitter of Alamouti.

The combination of Alamouti and Jones does not disclose the type of frequency hopping used in the DS/FH hybrid CDMA system. Fathallah discloses types of frequency hopping systems in column 1, lines 31-47. Slow frequency hopping (SFH) means that only one frequency-hop is achieved per bit, however, fast frequency hopping (FFH) means that a number of frequency hops are achieved for every information bit. FFH allows many hops to occur per bit; many more hops than are

conducted in slow frequency hopping. The additional hops enhance security and allow data to overcome noise and interference. Hops occur much more often and less data will be transmitted on frequencies that are experiencing interference. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the fast frequency hopping protocol of Fathallah into the hybrid CDMA system that employs DS/FH.

The combination of Alamouti, Jones and Fathallah does not disclose directly synthesizing a digital signal. Swanke discloses the use of direct digital synthesizers in frequency hopping systems (figure 1). The synthesizers receive synchronized frequency hopping control signals from a frequency spread sequencer. The mixer yields a constant resultant frequency output signal of greatly suppressed signal distortion during the hopping sequence (column 2, lines 25-31). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the direct digital synthesizer of Swanke into the combination of Alamouti, Jones and Fathallah.

Regarding claims 76-80, 108 and 109, the combination discloses the frequency hopping of the spread signals. In the FFH system, many hops will occur per bit; many more hops than are conducted in slow frequency hopping.

Regarding claims 81, 82, 110, 111 and 114-116, the combination does not disclose amplifying the transmitted signal. Official notice is taken that the amplification of signals prior to transmission is well known in the art of signal transmission. The amplification of signals allows noise in the transmission medium to be overcome and

the transmitted signal to be recovered properly at the receiver. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine an amplification circuit with the DS/FH hybrid CDMA system of the combination of Alamouti, Jones and Fathallah.

Regarding claims 83, 85, 112, 119 and 120, the language of the claim includes comprising language. This does not limit the claim to the group stated in the claim since the group comprises additional choices that are not recited in the claim.

Regarding claims 84, 86, 87, 113 and 117, the combination discloses outputting the proper PN code from the PN code generator when the desired proper PN code is to spread the user signals prior to transmission. Alamouti further discloses hybrid CDMA systems that employ direct sequence/frequency hopping/time hopping (DS/FH/TH) in column 2, lines 38-46.

Regarding claim 88, the language of the claim includes comprising language. This does not limit the claim to the group stated in the claim since the group comprises additional choices that are not recited in the claim.

Regarding claim 90, Fathallah discloses the band that comprises the carrier frequencies in the hopping sequence is selected prior to the transmission of the modulated signal.

Regarding claims 91, 93, 103 and 125-128, Alamouti discloses a transmitter and a method of transmitting for generating a hybrid spread spectrum signal to transmit user data. Alamouti discloses there are four types of CDMA protocols classified by modulation, two of which are direct sequence (or pseudo-noise) and frequency hopping

(column 2, lines 1-12). Column 2, lines 41-46 discloses well known hybrid CDMA systems comprising direct sequence/frequency hopping (DS/FH). Alamouti discloses the DS-CDMA protocol in greater detail in column 2, lines 12-27. DS-CDMA protocol spreads a user's data signal over a wide portion of the frequency spectrum by modulating the data signal with a unique code signal that is of higher bandwidth than the data signal (column 2, lines 12-21). Alamouti discloses the frequency hopping spread spectrum (FHSS) protocol in greater detail in column 2, lines 28-37. The FHSS protocol uses a unique code to change a value of the narrow band carrier frequency for successive bursts of the user's data signal (column 2, lines 28-33). The DS-CDMA and FHSS are the protocols combined in the hybrid DS/FH. Alamouti does not disclose a pseudo random (PN) code generator for generating a first stream of PN code words and a second stream of PN code words wherein the first stream of PN code words and the second stream of PN code words are interrelated by a predetermined relationship. Jones discloses a communication system utilizing cyclic code phase multiple access codes. Figure 11 shows the cyclic shifting of PN codes for each user signal. Each user signal is spread with different PN codes (column 15, line 66 to column 16, lines 19). The code sequences are obtained by cyclically shifting, by one chip at a time, a single code sequence, called a mother sequence. Figure 8 illustrates the bit synchronous relationship 602 of the spreading sequence, e.g. 604, 606 of different users, e.g. 608, 610, respectively, obtained by cyclic shifts of the mother sequence 604 (column 19, line 59 to column 20, line 25). Therefore, the each of the PN codes used in the multiple access system is generated by cyclically shifting a mother sequence. This is the

predetermined relationship between the first and second PN code words. Jones discloses it is advantageous to use these code words since the full cross correlation of the codes would be maintained for best multiple access performance, while the cyclic relationship between the independent sequences would enable simplification of gateway implementation (column 4, lines 6-16). Costs can also be reduced in the hardware (column 4, lines 17-30). For these reasons, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Jones into the transmitter of Alamouti.

The combination of Alamouti and Jones does not disclose the type of frequency hopping used in the DS/FH hybrid CDMA system. Fathallah discloses types of frequency hopping systems in column 1, lines 31-47. Slow frequency hopping (SFH) means that only one frequency-hop is achieved per bit, however, fast frequency hopping (FFH) means that a number of frequency hops are achieved for every information bit. FFH allows many hops to occur per bit; many more hops than are conducted in slow frequency hopping. The additional hops enhance security and allow data to overcome noise and interference. Hops occur much more often and less data will be transmitted on frequencies that are experiencing interference. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the fast frequency hopping protocol of Fathallah into the hybrid CDMA system that employs DS/FH.

The combination of Alamouti, Jones and Fathallah discloses the transmitter stated above. The combination does not disclose splitting the hybrid signal into two

identical components and modulating one of the components wherein the two antennas define an orthogonal polarization. A different embodiment of Alamouti discloses using polarization diversity to enable a base station to efficiently communicate with many remote stations (column 7, lines 28-32). This is possible because the antennas at the base station are designed to distinguish orthogonally polarized signals (column 7, lines 32-38). The antennas are shown in figure 1. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of polarization diversity of the embodiment of Alamouti into the combination of Alamouti, Jones and Fathallah.

The combination of Alamouti, Jones and Fathallah does not disclose directly synthesizing a digital signal. Swanke discloses the use of direct digital synthesizers in frequency hopping systems (figure 1). The synthesizers receive synchronized frequency hopping control signals from a frequency spread sequencer. The mixer yields a constant resultant frequency output signal of greatly suppressed signal distortion during the hopping sequence (column 2, lines 25-31). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the direct digital synthesizer of Swanke into the combination of Alamouti, Jones and Fathallah.

Regarding claim 92, the language of the claim includes comprising language. This does not limit the claim to the group stated in the claim since the group comprises additional choices that are not recited in the claim.

Regarding claims 94-96, 98, 99 and 129-132, the combination does not disclose amplifying the transmitted signal. Official notice is taken that the amplification of signals prior to transmission from each transmit antenna is well known in the art of signal transmission. The amplification of signals allows noise in the transmission medium to be overcome and the transmitted signal to be recovered properly at the receiver. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine an amplification circuit with the DS/FH hybrid CDMA system of the combination of Alamouti, Jones and Fathallah.

Regarding claim 97, the language of the claim includes comprising language. This does not limit the claim to the group stated in the claim since the group comprises additional choices that are not recited in the claim.

Regarding claims 101 and 102, the combination discloses the frequency hopping of the spread signals. In the FFH system, many hops will occur per bit; many more hops than are conducted in slow frequency hopping.

Regarding claims 104, 136 and 138, Alamouti discloses a transmitter and a method of transmitting for generating a hybrid spread spectrum signal to transmit user data. Alamouti discloses there are four types of CDMA protocols classified by modulation, two of which are direct sequence (or pseudo-noise) and frequency hopping (column 2, lines 1-12). Column 2, lines 41-46 discloses well known hybrid CDMA systems comprising direct sequence/frequency hopping (DS/FH). Alamouti discloses the DS-CDMA protocol in greater detail in column 2, lines 12-27. DS-CDMA protocol spreads a user's data signal over a wide portion of the frequency spectrum by

modulating the data signal with a unique code signal that is of higher bandwidth than the data signal (column 2, lines 12-21). Alamouti discloses the frequency hopping spread spectrum (FHSS) protocol in greater detail in column 2, lines 28-37. The FHSS protocol uses a unique code to change a value of the narrow band carrier frequency for successive bursts of the user's data signal (column 2, lines 28-33). The DS-CDMA and FHSS are the protocols combined in the hybrid DS/FH. Alamouti further discloses hybrid CDMA systems that employ direct sequence/frequency hopping/time hopping (DS/FH/TH) in column 2, lines 38-46. Alamouti does not disclose a pseudo random (PN) code generator for generating a first stream of PN code words and a second stream of PN code words wherein the first stream of PN code words and the second stream of PN code words are interrelated by a predetermined relationship. Jones discloses a communication system utilizing cyclic code phase multiple access codes. Figure 11 shows the cyclic shifting of PN codes for each user signal. Each user signal is spread with different PN codes (column 15, line 66 to column 16, lines 19). The code sequences are obtained by cyclically shifting, by one chip at a time, a single code sequence, called a mother sequence. Figure 8 illustrates the bit synchronous relationship 602 of the spreading sequence, e.g. 604, 606 of different users, e.g. 608, 610, respectively, obtained by cyclic shifts of the mother sequence 604 (column 19, line 59 to column 20, line 25). Therefore, the each of the PN codes used in the multiple access system is generated by cyclically shifting a mother sequence. This is the predetermined relationship between the first and second PN code words. Jones discloses it is advantageous to use these code words since the full cross correlation of

the codes would be maintained for best multiple access performance, while the cyclic relationship between the independent sequences would enable simplification of gateway implementation (column 4, lines 6-16). Costs can also be reduced in the hardware (column 4, lines 17-30). For these reasons, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Jones into the transmitter of Alamouti. The combination of Alamouti and Jones does not disclose the type of frequency hopping used in the DS/FH hybrid CDMA system. Fathallah discloses types of frequency hopping systems in column 1, lines 31-47. Slow frequency hopping (SFH) means that only one frequency-hop is achieved per bit, however, fast frequency hopping (FFH) means that a number of frequency hops are achieved for every information bit. FFH allows many hops to occur per bit; many more hops than are conducted in slow frequency hopping. The additional hops enhance security and allow data to overcome noise and interference. Hops occur much more often and less data will be transmitted on frequencies that are experiencing interference. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the fast frequency hopping protocol of Fathallah into the hybrid CDMA system that employs DS/FH. The combination discloses outputting the proper PN code from the PN code generator when the desired proper PN code is to spread the user signals prior to transmission. The combination of Alamouti, Jones and Fathallah does not disclose directly synthesizing a digital signal. Swanke discloses the use of direct digital synthesizers in frequency hopping systems (figure 1). The synthesizers receive synchronized frequency hopping control signals from a

frequency spread sequencer. The mixer yields a constant resultant frequency output signal of greatly suppressed signal distortion during the hopping sequence (column 2, lines 25-31). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the direct digital synthesizer of Swanke into the combination of Alamouti, Jones and Fathallah.

Regarding claim 105, the combination does not disclose amplifying the transmitted signal. Official notice is taken that the amplification of signals prior to transmission is well known in the art of signal transmission. The amplification of signals allows noise in the transmission medium to be overcome and the transmitted signal to be recovered properly at the receiver. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine an amplification circuit with the DS/FH hybrid CDMA system of the combination of Alamouti, Jones and Fathallah.

Regarding claims 106 and 139, the language of the claim includes comprising language. This does not limit the claim to the group stated in the claim since the group comprises additional choices that are not recited in the claim.

Regarding claims 121, 122 and 140, the combination of Alamouti, Jones and Fathallah discloses the transmitter stated above. The combination does not disclose splitting the hybrid signal into two identical components and modulating one of the components wherein the two antennas define an orthogonal polarization. A different embodiment of Alamouti discloses using polarization diversity to enable a base station to efficiently communicate with many remote stations (column 7, lines 28-32). This is

possible because the antennas at the base station are designed to distinguish orthogonally polarized signals (column 7, lines 32-38). The antennas are shown in figure 1. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of polarization diversity of the embodiment of Alamouti into the combination of Alamouti, Jones and Fathallah.

Regarding claims 133 and 134, the combination discloses outputting the proper PN code from the PN code generator when the desired proper PN code is to spread the user signals prior to transmission. Alamouti further discloses hybrid CDMA systems that employ direct sequence/frequency hopping/time hopping (DS/FH/TH) in column 2, lines 38-46.

Regarding claim 135, the language of the claim includes comprising language. This does not limit the claim to the group stated in the claim since the group comprises additional choices that are not recited in the claim.

Regarding claim 137, the frequency hopping comprises hops thought the entire frequency band.

6. Claim 123 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti et al (US 6,853,629) in view of Fathallah et al (US 6,381,053) in view of Jones et al (US 6,108,317) further in view of Swanke (US 5,521,533) further in view of Becker (6,726,099).

Regarding claim 123, the combination of Alamouti, Jones, Fathallah and Swanke discloses the method stated above in paragraph 5. The combination does not disclose

the method comprising transmitting the signal to a radio frequency tag and receiving information from the radio tag. Becker discloses transmitting an RFID tag and receiving information from the tag (figures 1 and 2). It is known to attach RFID tags to articles to be monitored (column 1, lines 41-55). This can be used for security or for inventory management. For these reasons, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the RFID transmission and reception system of Becker into the combination of Alamouti, Jones and Fathallah.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In data communication systems, a bit comprises chips and in fast frequency hopping each frequency hop will comprise at least one chip. When multiple hops occur per bit, the transmission of the bit will comprise transmissions comprising chips at multiple frequencies. Takasaki (US 5,625,641) is provided as an example of this inherent relationship of fast frequency hopping. Column 1, lines 22-26 states "A piece of the signal cut and divided into pieces is called a 'chip' and the length thereof is referred to as a chip period T_c (sec). A system of setting the chip period T_c to a bit period T_b or below is called Fast Frequency Hopping Spread Spectrum (abbreviated hereinafter as FFHSS) system." Column 1, lines 34-38 states "When FIG. 1 is taken as an example, it is shown that the hopping sequence length M is 4, and the adopted hopping sequence is '1, 4, 2, 3'. Four chip signals that constitute one bit are arranged in the frequency bands of f_1 , f_4 , f_2 and f_3 , respectively."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin M. Burd/
Primary Examiner, Art Unit 2611
5/4/2009